

MATERIAL STANDARD**NETWORK TRANSFORMER - SUBWAY-TYPE 13 KV AND 26 KV****1. General.**

- 1.1 This specification covers 3Ø, 60-Hz, mineral-oil-filled, subway-type secondary network transformers, complete with a high-voltage disconnecting and grounding switch on one end and provision for mounting a network protector on the other end, all in accordance with ANSI C57.12.40-2000, except as modified.
- 1.2 Transformers connected wye-wye shall have shell-type construction, or five-legged type cores, or provision for handling tank heating under unbalanced loading or fault conditions.
- 1.3 Transformers connected delta-wye may have a three-legged core.

2. Related Standards. Transformers supplied under this specification shall also meet the requirements of ANSI C57.12.00-2000, ANSI C57.12.90-1999, NEMA Pub. 107-1987, NEMA TRI-1980, ANSI B1.1-1989, ANSI B2.1.001-1990 through B2.1.010-1990, ANSI B2.1.011-1991 through B2.1.015-1991, ANSI C57.12.70-1978 (R 1993) and ANSI C57.12.80-1978 (R 1992).

3. Ratings.

- 3.1 The kVA ratings shall be 500 through 2,500 kVA as specified on the purchase requisition.
- 3.2 The voltage ratings shall be:

Nominal System Voltage	Transformer High Voltage			kVA Ratings for Low Voltage Ratings of:	
	Taps				
	Rating	Above	Below	216Y / 125	480Y / 277
13750Y/7940	13750 Delta	14438/140934	13406/13063	500-1000	500-2500
26400Y/15242	26400 Delta	27720/27060	25740/25080	500-1000	500-2500
25564Y/14760	26400Y/15242	27060	25740/25080/24420	500-1000	500-2500

The transformer high-voltage rating and low-voltage rating will be stated on the purchase requisition.

- 3.3 The transformer shall be designed for a 55° C/65° C average winding temperature rise and this shall be clearly stated in the bid. The insulation system shall be constructed of 65° C rise material. The nameplate shall show the dual rating of the transformer.

4. Insulation. The basic insulation level (BIL) shall be:

High Voltage Rating	BIL
13750 Delta	95 kV
26400 Delta	125 kV
26400Y/15242	125 kV

5. Impedance. The impedance ratings shall be in accordance with ANSI C57.12.40, Table 3.

6. Audible Sound Levels. The transformer sound level shall not exceed the values given in Table 4 of C57.12.40 and measured in accordance with C57.12.90. The sound level of the transformers may be tested by Seattle City Light. Transformers failing to meet the average sound levels listed in Table 4 will be rejected and returned at the manufacturer's expense.

ORIGINATOR	STANDARDS COORDINATOR	STANDARDS SUPERVISOR	UNIT DIRECTOR
<i>Thomas A. Guey</i>	<i>Jim S. Horn</i>	<i>John C. Rimmer</i>	<i>Harold J. J.</i>

7. Electrical Test.

- 7.1 Electrical tests shall be made in accordance with ANSI C57.12.00 and C57.12.90.
- 7.2 The transformer may be tested for radio influence voltage in accordance with NEMA publication 107. The test circuit shall be as shown in Figure 1 of NEMA 107, tuned to 1 MHz. The RIV levels shall be in accordance with NEMA TR1, Section 7.01 except that the test voltage shall be as listed below. Transformers failing this test will be rejected and returned at the manufacturer's expense.

H.V. Rating	Test Voltage	Max. RIV, Microvolts
13750 Delta	9.2 kV	250
26400 Delta	17.4 kV	250
26400Y/15242	17.4 kV	250

- 7.3 **Test Tags.** Each transformer shall have a durable, weatherproof tag attached stating: "This transformer has been tested at rated line voltage and has successfully passed all applicable tests specified by ANSI and NEMA." The tag shall show the transformer serial number, the date, and name of the person who made the test. (State of Washington, Safety Statutes, Section 19.29.010, Rule 5.0.)
- 7.4 Seattle City Light's receiving inspection will include a non destructive "Polarization Index" to indicate excessive moisture. This consists of comparing a 1000 V megger test at one minute to that of ten minutes. A polarization index of less than 1.2 will be cause for concern and will require an explanation by the manufacturer for each unit.

8. Construction.

- 8.1 **Bushings and Terminals.** Bushings and terminals shall be in accordance with ANSI C57.12.40, Section 7 except the external low-voltage neutral terminal shall be made of copper. The electric interlock bushing or "spark plug" in the secondary throat shall be furnished with a 10-32 or 1/4-20 stud.
- 8.2 **Chambers.** The chambers shall consist of either (a) a switch chamber and a terminal chamber in accordance with sections 5.4.4.1 and ANSI C57.12.40 figure 1 of this specification **or** (b) a combination switch/terminal chamber in accordance with section 8.2.4 of this specification.

8.2.1 **Switch Chamber.** The high-voltage switch chamber shall be in accordance with ANSI C57.12.40, Section 5, figures 1 and 2, except:

- A viewing window(s) shall be provided to permit visual inspection of the switch blades of all three phases. The window(s) shall be protected with a cover plate(s), hinged at the top.
- The inside of the switch chamber, the flange face, and the inside of the switch chamber cover from edge to edge shall be painted with the following coats.

One coat of 2-component primer:

Component A: DuPont 824S light gray Corlar epoxy.

Component B: DuPont 826S activator.

Two coats of 2-component epoxy topcoat:

Component A: Preservative "High performance coating tripoxy polyamide" 88-580 white.

Component B: Preservative 88-101 clear.

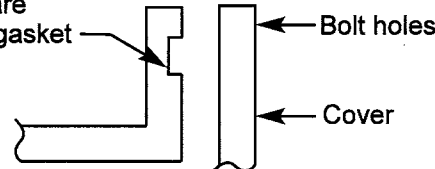
The flange face must be epoxy painted, but need not be white.

Or equal. For other paints to be considered, manufacturer's specification sheets shall be submitted with the bid. If alternative paints are approved by Seattle City Light and used, Material Safety Data Sheets shall be shipped with the transformers.

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- c. For shipment, the switch chamber shall be drained of oil and shipped with dry air or nitrogen at 2 psig.
- d. The switch chamber (and high-voltage terminal chamber) shall have a bolted and gasketed cover with silicon bronze or stainless steel bolts, nuts, and washers. The gasket shall be made from cork and synthetic rubber (BUNA-N), and the cover shall have a means for breaking the seal (jack screws). An alternative method of gasketing on vertical surfaces, which will not require seal breakers, is shown below using 100 percent nitrile rubber gasketing material.

Groove: 0.250" deep by 0.625"
wide for 0.375" square
100% nitrile rubber gasket



Not to scale

The groove retaining the gasket shall be continuous with no breaks in the sides. All surfaces shall be painted and dried prior to installation of gaskets. A light application of insulating varnish may be applied in the bottom of the groove to hold the gasket in place on vertical surfaces. All gasket joints shall be of the butt type. Other methods of gasketing shall receive Utility approval prior to bidding.

- e. The switch chamber shall include all of the accessory equipment listed in ANSI C57.12.40, Section 5.4 except that the vent/level plugs shall have brass hex heads. The drain valve shall be equipped with a brass plug with a 13/16" square head (see Appendix C for suppliers).
- f. A stainless steel nameplate shall be affixed to the switch chamber cover or to the side of the switch chamber/terminal chamber above the operating handle with stainless steel fasteners. The nameplate shall state all of the following information:
 - (1) CAUTION: NONLOAD BREAK SWITCH. (This in 1/4" letters.)
 - (2) This switch will interrupt transformer exciting current only. Do not interrupt load current.
 - (3) Terminal chamber with disconnect and grounding switch.
 - (4) Two interlock circuits, single-phase.
 - (5) Hertz _____.
 - (6) Rated voltage _____.
 - (7) Rated amperes _____.
 - (8) Direct current test voltage _____ kV.
 - (9) Momentary amperes when closed _____.
 - (10) Type of insulating oil.
 - (11) Terminal chamber volume in gallons.
 - (12) Switch chamber volume in gallons.
 - (13) Serial no. _____.
 - (14) Manufacturer of switch.
 - (15) Maintenance manual no. _____.

- 8.2.2 **Primary Switch.** The high-voltage disconnecting and grounding switch shall be in accordance with ANSI C57.12.40, Section 5 except:
- Approved suppliers of high-voltage switches are the manufacturers listed in the Appendix. Manufacturers of high-voltage disconnecting and grounding switches must submit electrical data, test data, and a working sample for detailed evaluation and approval before being listed as an approved manufacturer.
 - The switch shall be capable of interrupting the transformer exciting current in accordance with ANSI C57.12.40, Section 5.2.3.2.
 - Two electrical interlocks shall be provided:
 - To prevent the switch from moving from the closed to the ground position when the transformer is energized.
 - To prevent the switch from being moved from the closed to the open position when the network protector is in the "closed" position. This interlock shall lock when de-energized.
 - The interlock operating coils shall be rated 125 V for 216Y/125 V units or 277 V for 480Y/277 V units and shall be permanently labeled with the rated voltage. Coil rating labels shall be visible when the switch chamber cover is off.
- 8.2.3 **Primary Terminal Chamber.** The high-voltage terminal chamber shall be in accordance with ANSI C57.12.40, Section 5.3 except:
- The inside of the terminal chamber, the flange face, and the inside of the terminal chamber cover from edge to edge shall be painted with the following coats:

One coat of 2-component primer:
Component A: DuPont 824S light gray Corlar epoxy.
Component B: DuPont 826S activator.

Two coats of 2-component epoxy topcoat:
Component A: Preservative "High performance coating tripoxy polyamide" 88-580 white.
Component B: Preservative 88-101 clear.

The flange face must be epoxy painted, but need not be white.

Or equal. For other paints to be considered, manufacturer's specification sheets shall be submitted with the bid. If alternative paints are approved by Seattle City Light and used, Material Safety Data Sheets shall be shipped with the transformers.
 - The terminal chamber shall have a bolted and gasketed cover as specified in section 8.2.1(d) of this standard.
 - The terminal chamber shall be drained of oil and shipped with dry air or nitrogen at 2 psig.
 - The terminal chamber shall include all of the accessory equipment listed in ANSI C57.12.40, Section 5.3 except that the vent/level plug shall have a brass hex head and the terminal chamber shall also include a drain valve with a brass plug with a 13/16" square head. A liquid-level gauge shall be provided similar to C57.12.40, Section 5.4.3. If a sight glass is used instead of a nongasketed-type magnetic liquid-level indicator it shall be equipped with a metal cover (to protect the glass) which can be easily lifted/removed for viewing.
 - The high-voltage cable entrances, including lugs, nuts, lockouts, and conductor leads for connecting the high-voltage cable entrance to the high-voltage bushings, shall be furnished in accordance with ANSI C57.12.40, Section 5.5 except the cable entrance shall be the following:
 - Three primary entrance bushings shall be welded on the top of the terminal chamber. The bushings shall be rated 600 amperes, 125-kV BIL and shall be suitable for operation on a 25,564 Grd.Y/14,760 V system. Gasketed bushings

are not acceptable. The bushings shall be labeled H₁, H₂, or H₃ appropriately adjacent to each bushing. The three bushings shall be mounted on a horizontal line 6" on centers. The entrance bushings (Item 21c) shall be permanently connected to the high-voltage bushings (Item 30), using a flat stainless steel washer and a Belleville washer. See Figure 1 of ANSI C57.12.40 for Items 21c and 30.

The bushings shall be Elastimold Apparatus Bushing #K600T1. Other manufacturers' bushings may be acceptable provided (a) they are the welded-in type and (b) certified test data are submitted showing that the bushings are interchangeable with Elastimold #K655 BSR apparatus interfaces and have electrical ratings equal or better.

- (2) Each bushing shall have a cap to prevent the entrance of moisture or contamination during shipping and storage. The bushings shall be protected against damage during shipping and temporary storage with a wood or metal cover that is securely fastened to the transformer.

8.2.4 Combination Switch and Terminal Chamber. A single switch/terminal chamber will be acceptable providing:

- a. The high voltage bushing listed in section 8.2.3 e of this specification may not be used to support switch contacts in any way. Only flexible cable leads may be connected to the bushings.
- b. The switch operating handle shall be 36" to 48" above the ground.
- c. Only one set of drain valve, vent/level plug, and liquid level gauge is required and shall be per section 8.2.1.
- d. The single chamber shall meet all other aspects of sections 8.2.1, 8.2.2, and 8.2.3 of this specification.
- e. The viewing window shall be large enough to see the bottom of the bushings in oil.

8.3 Accessory equipment for transformer tanks. Accessory equipment shall be provided in accordance with ANSI C57.12.40, Section 6.4, except as specified herein.

8.3.1 Tap Changer. The tap changer shall be manually operated for changing simultaneously all 3Ø connections in the high-voltage windings when the transformer is deenergized. A tap changing wrench shall be furnished and mounted in a suitable holder on the transformer cover after the transformer has been painted. The opening for the wrench shall be through a welded on pipe nipple and a pipe cap.

8.3.2 Air Test Provision. The 1/2" NPT opening and pipe plug specified in ANSI C57.12.40, Section 6.4.2 shall be provided; the pipe plug shall be brass and have a hex head. An additional 1/4" NPT opening shall be provided; it shall be equipped with a 1/4" NPT brass plug with a hex head. The 1/4" opening shall be located in the tank wall, above the 85°C liquid level, on the primary end behind the primary terminal chamber extension (so as to protect a utility-installed Schraeder valve from damage by a shear blow or lifting slings).

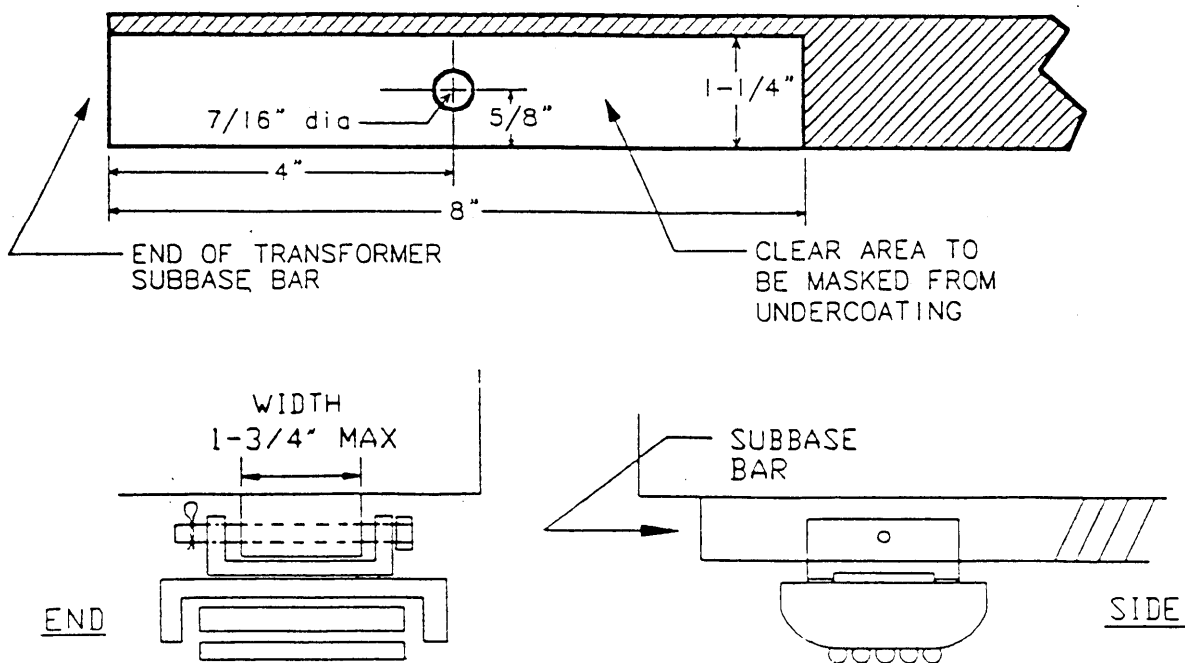
8.3.3 Liquid-Level Indicator. The welded-on nongasketed type magnetic liquid-level indicator shall have nongrounded alarm contacts. The contacts shall be suitable for interrupting at:

- a. 0.20 ampere direct-current inductive load,
- b. 0.20 ampere direct-current noninductive load, and
- c. 2.5 amperes alternating current noninductive or inductive load.

The contacts shall be insulated for operation on a 250 V circuit and shall be calibrated for minimum acceptable liquid level.

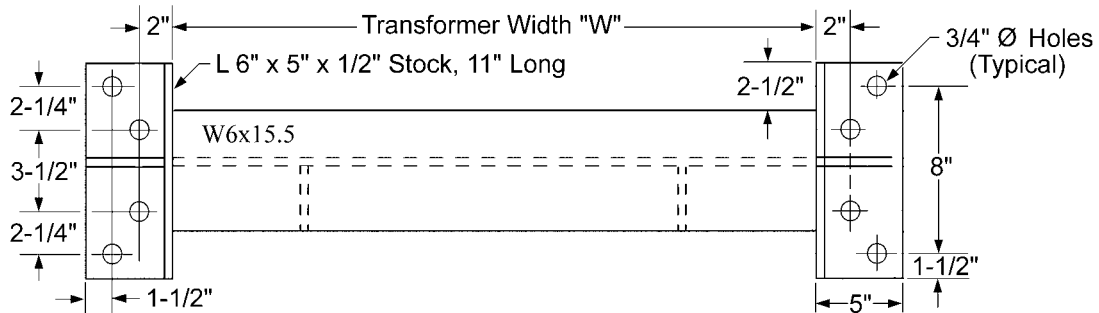
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- 8.3.4 **Dial-Type Thermometer.** A dial type thermometer with normally open alarm contacts shall be supplied per ANSI C57.12.40 Section 6.4.4 except with alarm contacts. The alarm contacts shall have electrical ratings described in Section 8.3.3 of this Standard and shall be calibrated for 80° C.
- 8.3.5 **Valves and Sampling Devices.** All valves, fittings, pipe plugs, and bushings shall be of corrosion resistant material (brass or stainless steel) and shall be installed with nonconducting pipe thread compound (Rector Seal #2, Rector Seal #5), or equivalent. Teflon tape shall not be used as the thread sealer. Filter press connections shall not be provided.
- 8.3.5.1 The bottom drain valve shall be equipped with a brass plug with a 13/16" square head. Filter press connection shall not be supplied.
- 8.3.5.2 The filling plug shall be located in the handhole cover as specified in Section 8.7.1 of this Standard. Filter press connection shall not be supplied.
- 8.3.6 **Transformer Subbase.** The subbase bars shall have the following provisions for attachment of Hillman "Cat Track" transport devices. Each bar shall have two 7/16" diameter holes, one hole centered 4" from each end of the bar, and 5/8" from the bottom of the bar as shown below. 8" on each end of the bar shall be masked from undercoating up to 1-1/4" from the bottom as shown. The subbase bar shall have a maximum width of 1-3/4".

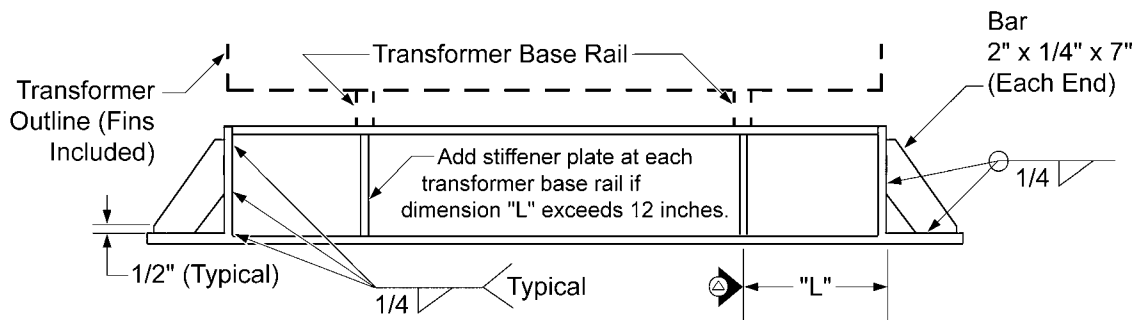


8.3.7 Transformer Anchor Beam for Seismic Loading (Earthquake Anchors). The manufacturer shall provide two earthquake anchor beams with each transformer.

8.3.7.1 See construction drawing for details. The anchor beam lengths shall be appropriately customized to fit each transformer base.



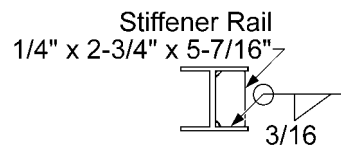
BEAM PLAN



BEAM ELEVATION

8.3.7.2 Fabrication Notes

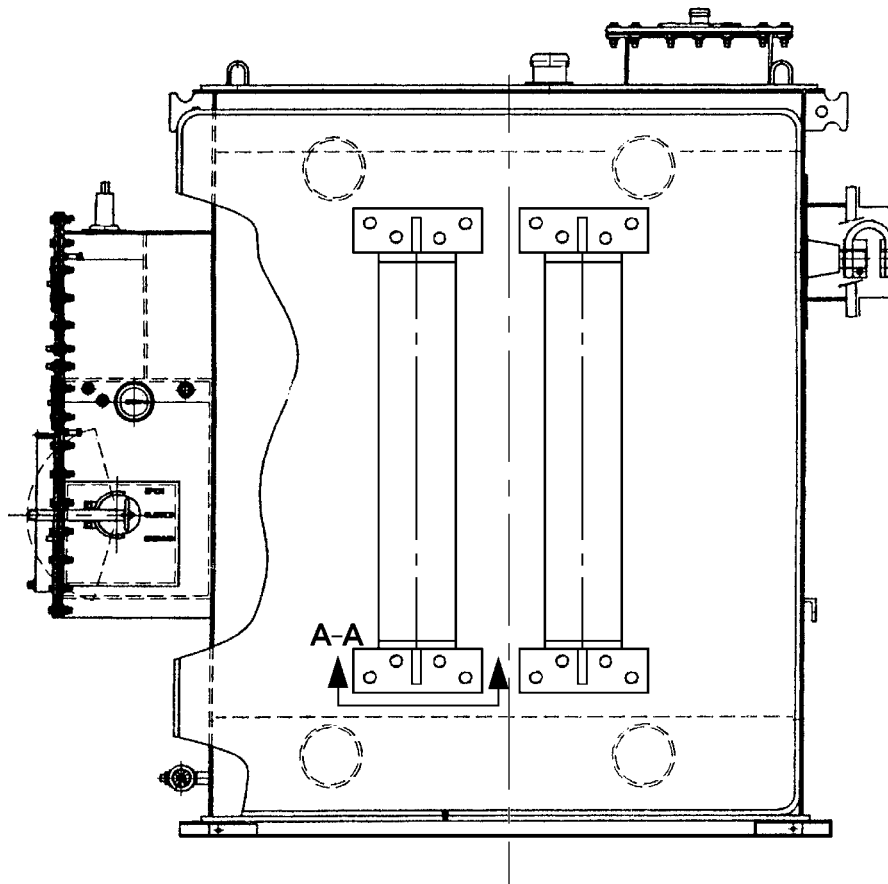
- Structural steel to be ASTM A-36.
- Paint with one coat of Devco Coatings Bar-Rust 235
- Dimensions W & L will be specified or field measured.
- Two anchor beams are required per transformer.



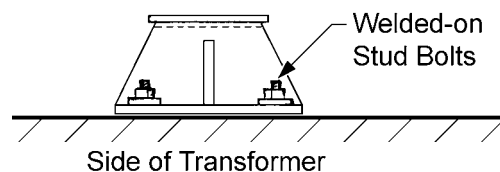
STIFFENER DETAIL

- 8.3.7.3 For shipment and storage, the anchor beams shall be securely attached to each transformer tank, preferably in a vertical position so as not to collect water and debris during shipment and storage. Attaching the anchor beams to the pallet or separate shipment is not allowed.

The method for attaching each end of the anchor beams to the transformers shall be four $\frac{5}{8}$ " x 1- $\frac{1}{2}$ " welded-on stud bolts, nuts and washers or an approved equivalent. The anchor beams shall be positioned and cushioned so that water and debris cannot accumulate and so that the beams do not damage the transformer finish.



Anchor Beams Mounted on Transformer Tank for Shipping



Section A-A

8.4 Angular Displacement and Terminal Markings

8.4.1 The transformer shall be connected to give the voltage relations as follows:

Rated Voltage	Phase Relationship
13750 Delta-216Y/125 13750 Delta-480Y/277	
26400 Delta-216Y/125 26400 Delta-480Y/277	
26400Y/15,242-216Y/125 26400Y/15,242-480Y/277	

8.4.2 Terminal markings shall conform to ANSI C57.12.40, Section 7.3.

8.5 Nameplate. The nameplate shall conform to ANSI C57.12.40, Section 9 except:

- A. The nameplate shall be stainless steel and shall be affixed to the transformer with stainless steel fasteners.
- B. The nameplate shall include the month/year of manufacture.
- C. The maximum allowable positive and negative pressure shall be labeled on the nameplate for all sizes.
- D. The nameplate shall state: "Contains less than 1 ppm PCB at time of manufacture."
- E. The nameplate shall show the H_0X_0 switch in either the phase or connecting diagram, or in both diagrams (for wye-wye connected transformers).

8.6 Transformer Connections for Shipment by Manufacturer. The transformer connections for shipment shall conform to ANSI C57.12.40, Section 10.

8.7 Tank: The tank, handhole cover, dimensions, and finish shall conform to ANSI C57.12.40.

8.7.1 Handhole: A handhole shall be provided adjacent to the low-voltage bushings in accordance with ANSI C57.12.40, Section 6.3.4. The handhole and cover shall also meet the requirements of the latest revision of Seattle City Light Material Standard Supplement Number 0038.nn. The handhole cover, with a one-piece, reusable gasket extending edge to edge on the flange, shall be through-bolted to the raised flange which is welded to the transformer cover. Seal breaker (jack screws) shall be provided. Nitrile rubber gaskets are not acceptable. A 1-1/2" NPT entrance shall be located in the center of the handhold cover, complete with a pipe nipple and pipe cap. The handhole shall have a net opening of 200-400 square inches (1,290-2,580 square cm). For wye-wye connected transformers, a hand operable (no tools required) H_0X_0 switch shall be provided. The switch shall be accessible only from the handhole. It may be mounted on either the core and coil frame or the tank wall but not lower than 6" below the 25 C oil level.

Handhole Finish: From edge to edge, the inside of the handhole cover and the flange face to which it bolts shall be painted with the following coats.

One coat of 2-component primer:

Component A: DuPont 824S light gray or black Corlar epoxy.

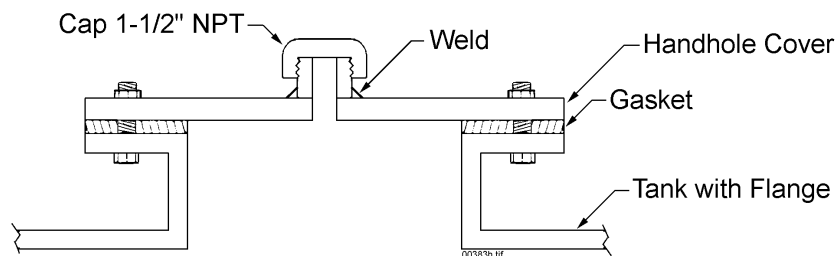
Component B: DuPont 826S activator.

Two coats of 2-component epoxy topcoat:

Component A: Preservative "High performance coating tripoxy polyamide" 88-580 white or black.

Component B: Preservative 88-101 clear.

Or equal. For other paints to be considered, manufacturer's specification sheets shall be submitted with the bid. If alternative paints are approved by Seattle City Light and used, Material Safety Data Sheets shall be shipped with the transformers.



8.7.2 The corrosion-resistant tank shall be in accordance with ANSI C57.12.40, Section 6.2.1 with the copper bearing steel thickness for subway-type transformers:

- a. 5/16" (0.31") (8 mm) thick tank walls and auxiliary coolers.
- b. 1/2" (0.50") (13 mm) thick cover and tank bottom..

8.7.3 The maximum tank dimensions shall be in accordance with ANSI C57.12.40, Section 6.5 and Table 9 except 26-kV transformers, 1,000 kVA and smaller, shall not be larger than 52" (132 cm) wide and 94" (238 cm) long.

8.7.4 The maximum overall height shall be as follows:

500 kVA	70" (1780 mm)
750 kVA	78" (1980 mm)
1,000 kVA	84" (2190 mm)
1,500 kVA	96" (2440 mm)
2,000 kVA	96" (2440 mm)
2,500 kVA	96" (2440 mm)

8.7.5 **Tank Finish:** shall be in accordance with ANSI C57.12.40, Section 6.2.4 except:

- a. The finish shall consist of at least three coats of chip-resistant, water-resistant, and corrosion-resistant paint suitable for underground vaults.
- b. The tank bottom shall be protected with automotive-type undercoating to a point 12" above the bottom of the base.

8.7.6 The tank external ground provisions shall be located per ANSI C57.12.40, Figure 2 and shall consist of an unpainted copper or copper faced steel, or a stainless steel pad 2" x 3-1/2" (50 mm x 89 mm) minimum with two 1/2" - 13 UNC tapped holes at 1-3/4" on centers. The tapped holes shall be filled with an oxide inhibiting compound.

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9. Transformer Oil. The transformer shall be shipped with inhibited naphthenic ASTM D-3487 Type II insulating oil in the tank.

10. Short Circuit Capability.

- 10.1 The transformer shall be constructed to have the mechanical capability of withstanding the short circuit stresses of the test in accordance with ANSI C57.12.90.
- 10.2 The manufacturer shall submit certified test data proving their design has performed satisfactorily when tested in accordance with ANSI C57.12.90. The test data shall prove compliance with:
- A. the visual inspection requirements of Section 12.5.1,
 - B. the dielectric tests of Section 12.5.2,
 - C. the wave shape of terminal voltage and current requirements of Section 12.5.3,
 - D. the leakage impedance allowable variations of Section 12.5.4,
 - E. the low-voltage impulse test of Section 12.5.5, and
 - F. the excitation current requirements of Section 12.5.6.

In addition, the manufacturer shall supply proof that the design tested is essentially the same design being supplied.

11. Losses. Transformer losses will be evaluated at full load at 75° C on the following basis.

- A. Core Losses at \$5.90 per watt
- B. Load Losses at \$1.30 per watt

(Total Losses = Core Losses + Load Losses)

12. Data to be Submitted With Bid. Each bidder shall submit with the proposal all the data listed below as is applicable to the item bid. The bidder shall submit a description of any changes, additions, or exceptions to the specifications that the bidder proposes, together with reasons for the departure. Product evaluation and conformance to specifications will be determined on the basis of information submitted. The drawings and data furnished must be in sufficient detail and clarity to enable making a complete and positive check with the technical provisions of the specifications.

- A. outline drawings of the equipment with overall dimensions;
- B. average no-load (core losses) and full-load losses (windings) at 75° C and, if other temperatures are used, provide an explanation and correction factor for each temperature;
- C. a statement that transformer design is for 55°/ 65° C rise design using 65° C rise material;
- D. impedance of windings at rated load expressed in terms of rated voltage;
- E. detailed information on short circuit capability (see Section 10.2, "Short Circuit Capability," of this Standard), see Appendix for manufacturers with prior approved data already on file at Seattle City Light;
- F. state all electrical tests given transformers at the factory and whether these tests apply to all units or only to sample units;
- G. total weight of completely assembled transformer, including oil, plus:
 - net weight of core and coils;
 - net weight of tank, fittings, and accessories; and
 - net weight of oil;
- H. type of inhibited oil and percent by weight of inhibitor; and
- I. high-voltage switch nameplate details.

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13. Data to be Furnished by Successful Bidder. The successful bidder shall supply the data listed below. The data shall be delivered to Seattle City Light, c/o Network Distribution Engineering, Suite 3100, 700 - 5th Avenue, Seattle, Washington 98104-5031.

- A. three certified copies of standard tests;
- B. three copies of outline dimensions of network transformer with all accessories;
- C. three copies of transformer nameplate drawing;
- D. three copies of the high-voltage switch nameplate drawing;
- E. three copies of an instruction book covering the installation, operation, and maintenance of the equipment furnished; and
- F. three copies of a renewal/spare parts list (bushings, switch parts, etc.).

14. Guarantee and Penalties.

- 14.1 Any transformer failing, due to defective design, material and/or workmanship, within 12 months after being energized or 18 months after delivery, shall be repaired or replaced without cost to Seattle City Light. Any defect in design, material and/or construction discovered within this period shall be corrected on all transformers furnished on this order at the manufacturer's expense, either by repair or replacement.
- 14.2 The manufacturer will be assessed a penalty for transformers delivered that exceed the Total Loss Value stated and calculated on the bid proposal.
 - 14.2.1 $\text{Total Loss Value} = (\text{Core Loss} \times \$5.90 \text{ per Watt}) + (\text{Load Loss} \times \$1.30 \text{ per watt})$
 - 14.2.2 The penalty shall be the difference between the total loss value delivered less the total loss value in the bid proposal. Penalties will be assessed on the basis of the average tested losses of all units built per line item of a purchase order, or per line item of a blanket purchase order release. Individual units with tested losses greater than those guaranteed in the bid proposal, but within the tolerances allowed in accordance with ANSI C57.12.00, Section 9.3, will be accepted, but subject to the loss penalty provisions.
 - 14.2.3 Tolerances will be allowed in accordance with ANSI C57.12.00, Section 9.3, except, this shall apply to a given order of transformers of a given size and voltage; i.e., one line item.
- 14.3 Upon delivery, all transformers will be tested and inspected by City Light. Transformers that fail to pass the tests will be returned to the manufacturer. The cost of retesting transformers that have been returned to the manufacturer for correction of defects will be charged to the manufacturer.

APPENDIX

- A. Approved manufacturers of high-voltage disconnecting and grounding switches:
 - 1. ABB Power T&D Company Inc.
 - 2. Quality Switch Inc.
 - 3. Ferranti-Packard Transformers Ltd.
 - 4. General Electric Company
 - 5. Kuhlman Corporation
 - 6. The Specialty Switch Company
 - 7. Square D Company
- B. Manufacturers who have submitted prior approved short circuit data already on file at Seattle City Light:
 - 1. ABB Power T&D Company Inc.
 - 2. Carte International Inc.
 - 3. Ferranti-Packard Transformers Ltd.
 - 4. General Electric Company
 - 5. Kuhlman Corporation
 - 6. Pioneer Transformers
 - 7. Square D Company
- C. Brass pipe plugs with hex heads are available from: Dana-Weatherhead, 3152 series; Parker Fluid Connectors, 218P series; or equal.